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Thermal Network Analyzer Program

The problem:

To produce a one, two, or three-dimensional temperature distribution in any solid body subject to convective, radiation or adiabatic boundary conditions with provision for heating from internal heat generation. There should also be a capability of transient or steady-state solutions.

The solution:

This program solves transient or steady-state heat flow problems through the concept of lumped parameters expressed as the electrical analog of the heat transfer problem using finite differences techniques.

How it's done:

The Thermal Network Analyzer Program solves n-dimensional transient heat flow problems through the use of an electrical analog of the thermal network expressing the heat flow problem to be solved.

The vast majority of heat flow problems may, by lumping the physical parameters, be represented by a thermal resistance-thermal capacitance network with the capability of heat input at any of the discrete "nodes" in the network.

The user generates a one, two, or three-dimensional network mesh with the nodal points at the centroid of each element of the mesh. Prior to input, it is neces-

sary to compute thermal resistances between nodes and thermal capacitance, for the transient solution, based on an initial estimate of temperature.

The program will accept tables of variable thermal conductivity and specific heat as a function of temperature and modifies resistances and capacitances in successive iterations.

Notes:

1. The program is limited to 400 nodal points and 700 resistors.
2. This program is written in FORTRAN IV language for use on the IBM-7094 computer.
3. Inquiries should be made to:

COSMIC
Computer Center
University of Georgia
Athens, Georgia 30601
Reference: B69-10239

Patent status:

No patent action is contemplated by NASA.

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